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PATENT APPLICATION
PO7787
HE-170

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION OF	)
	) GROUP NO.: 1714
HANS-MICHAEL SULZBACH ET AL	)
	)
SERIAL NUMBER: 10/656,349	) EXAMINER:
	) Patrick Dennis Niland
FILED: September 5, 2003	)
	)
TITLE: METHOD FOR MIXING A POLYOL COMPONENT AND AN ISOCYANATE COMPONENT	)))

LETTER

Mail Stop - Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 2231-1450

Sir:

Enclosed is an Appeal Brief in the matter of the subject Appeal. Please charge the fee for filing the Brief, $500.00, to our Deposit Account Number 13-3848. Triplicate copies of this paper are enclosed.

Respectfully submitted,

By ______________________
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Date
John E. Mrozinski, Jr., Reg. No. 46,179
Name of applicant, assignee or Registered Representative
____
Signature
November 7, 2006
Date

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HANS-MICHAEL SULZBACH ET AL	) GROUP ART UNIT: 1714
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APPEAL BRIEF UNDER 37 CFR §1.192

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The present Appeal Brief is submitted in support of the Notice of Appeal filed September 7, 2006.

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Date
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Signature
November 7, 2006
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I. REAL PARTY IN INTEREST

The real party in interest for the present Application Serial No. 10/656,349 is Hennecke GmbH, of Leverkusen, Germany, by virtue of the assignment executed August 8, 2003; August 11, 2003; and August 19, 2003.

II. RELATED APPEALS AND INTERFERENCES

On September 7, 2006, a Notice of Appeal was filed in Application Serial No. 10/656,349. There are no pending appeals or interferences of which Appellants are aware that would be affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF THE CLAIMS

Appellants herewith appeal the final rejection of Claims 1-12. Claims 1-12 are pending and stand rejected. A complete copy of the appealed claims is set forth in the Appendix.

IV. STATUS OF AMENDMENTS AFTER FINAL

An Amendment under 37 CFR § 1.116 was filed on August 11, 2006. In the Advisory Action dated August 29, 2006, the Examiner indicated that the amendment would be entered because, "Applicant's reply has overcome the following rejection(s): the 112 rejection of paragraph 2 of the final rejection of 6/12/06." The Examiner further indicated that although it would be entered, the amendment did not place the claims in condition for allowance, "for the reasons stated in the final rejection."

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention relates to a method for the production of a polyurethane foam material, the improvement comprising controlling cell size in the foam made by continuous mixing of at least one polyol component and at least one isocyanate component and optionally additives to form a polyurethane reaction mixture in a stirrer mixer which comprises a cylindrical mixing chamber having a

stirrer rotating therein with adjustable rotational speed, the stirrer containing a stirrer shaft and scoops or blades arranged thereon in one or more levels, the stirrer mixer having feed openings for at least the polyol component, the isocyanate component and optionally the additives and an outlet opening for the polyurethane reaction mixture, wherein three to six scoops or blades are arranged in each level on the stirrer shaft such that the scoops or blades are rotated by an angle α of 10° to 80° counter to the axis of rotation of the stirrer shaft, said method comprising pumping the polyol component, the isocyanate component and optionally the additives in a metered manner through the feed openings into the cylindrical mixing chamber and mixing therein to form the polyurethane reaction mixture; discharging the polyurethane reaction mixture from the mixing chamber through the outlet opening; and reducing the polyurethane reaction mixture pressure in an adjustable throttle, wherein the cell size is controlled by adjusting pressure in the mixing chamber by a mutually matched setting of the rotational speed of the stirrer and of the throttling effect of the throttle. (Found at least at page 4, lines 12-29)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 1-12 stand rejected under 35 U.S.C. §103(a) as being rendered obvious by U.S. Pat. No. 3,346,529 issued to Peters, U.S. Pat. No. 3,807,703 issued to Day, U.S. Pat. No. 5,100,699 issued to Roeser, U.S. Pat. No. 3,319,937 issued to Wilson et al., U.S. Pat. No. 3,051,455 issued to Magester and U.S. Pat. No. 3,881,871 issued to Porter. With respect to this ground of rejection, Appellants admit that Claims 1-12 stand or fall together.

VII. ARGUMENT

As will be set forth in detail below, Claims 1-12 are not rendered obvious by U.S. Pat. No. 3,346,529 issued to Peters, U.S. Pat. No. 3,807,703 issued to Day, U.S. Pat. No. 5,100,699 issued to Roeser, U.S. Pat. No. 3,319,937 issued to Wilson et al., U.S. Pat. No. 3,051,455 issued to Magester and U.S. Pat. No. 3,881,871 issued to Porter. Accordingly the rejections under 35 U.S.C. §103(a) should be reversed, and favorable action by the Board is respectfully requested.

A. The Rejection under 35 U.S.C. §103(a) as being rendered unpatentable over Peters, Day, Roeser, Wilson et al., Magester and Porter is Improper

Claims 1-12 have been rejected under 35 U.S.C. §103 as being unpatentable over U.S. Pat. No. 3,346,529 issued to Peters, U.S. Pat. No. 3,807,703 issued to Day, U.S. Pat. No. 5,100,699 issued to Roeser, U.S. Pat. No. 3,319,937 issued to Wilson et al., U.S. Pat. No. 3,051,455 issued to Magester and U.S. Pat. No. 3,881,871 issued to Porter. As will be set forth below, Appellants submit that Claims 1-12 are not rendered obvious by the cited art either individually or in combination and the rejections thereof should be reversed.

1. *The Examiner's Rationale*

The Examiner has alleged in paragraph numbered 3, beginning at page 3, of the Final Office Action mailed June 12, 2006 that,

> These references each relate to continuously mixing polymer reaction mixtures to produce polyurethane foam and the devices for mixing the reactants. The shear and pressures generated in the devices of the prior art necessarily and inherently controls cell size. The method and device of Day is most similar to that of the instant claims and Day uses it to mix polyols and polyisocyanates and additives to make polyurethane foams, i.e. microporous polyurethanes, by mixing polyols and polyisocyanates and additives. See the figure on the cover of the patent and the entirety of the disclosure, particularly column 1, lines 37-68 and column 2, lines 1-67. It however lacks the so-called throttle of the instant claims and does not specify that the mixer has variable rotational speed. The baffle means of column 6, lines 29-58 meets the elements of the instant claim 11. "Injected" of column 4, line 44 et seq. implies "pumping" of the instant claims.
>
> It would have been obvious to one of ordinary skill in the art at the time of the instant invention to use the pinch valve of the instant claim 10 on the nozzle 16 of Day because such valves are known for aiding in precision dispensing as taught by Roeser, column 3, lines 27-51 and would have been expected to give the benefits disclosed by Roeser to the device of Day.
>
> Porter describes the back pressure created by such valves in similar systems and the desirability of such back pressure. This is thought by the examiner to be understood by the ordinary skilled artisan who is

expected to have studied fluid dynamics and Bernoulli's principles in undergrad classes. It would have been obvious to one of ordinary skill in the art at the time of the instant invention to use the blade pitches of the instant claim1 and 4 to 6, which are not taught by Day, because these pitches give only predictable results relating to the back pressure described by Porter and the flow of material through the mixer described by Day when considered with the blade surface area and shape, the number of blades, and the rotational speed of the blades. No unexpected result stemming only from the blade angle is seen in a manner commensurate in scope with the cited prior art and the instant claims.

It would have been obvious to one of ordinary skill in the art at the time of the instant invention to use adjustable rotational speed for the stirrer of Day because Day implies such when one considers the disclosure of the variety of throughput rates of column 6, lines 59-61 in combination with the disclosure of column 3, lines 52-68; Magester shows that variable dispensing rates are required and why; such dispensing rates are related to the pressure in the mixing chamber which is related to the speed of the angled blades and is predictable considering Bernoulli's principles; and Wilson et al shows that the ordinary skilled artisan knows to vary paddle, i.e. blade, speed to change foam pore size at column 4, lines 62-69. Varying throughput is most easily accomplished by varying the speed of the blades creating the flow through the mixer. Furthermore, such variable speed mixers are well known.

The above discussed mixing device would clearly be useful as the "continuous reactor" of Peters, Fig. 1 or in the alternative, the above discussed modifications that are applicable to the continuous reactor of Peters Figure 1 would have been obvious to have been made to this reactor for the same reasons as applied to the mixer of Day.

It would have been obvious to one of ordinary skill in the art to use the above device to form the instantly claimed foam because Day column 6, lines 58-68 shows his device to be versatile and useful in other processes as well as to have the capability of mixing polyurethane forming reactants to give a microporous polyurethane and each of Magester, which uses a very similar device to day and the instant claims, Wilson et al., and Porter show similar mixing devices to be useful in making polyurethane foams with Wilson noting the relationship between shear rate and cell size as stated above.

It is expected that the continuous mixing process, rotational rate, blade pitch, high velocity interchamber flow, the injection pump pressure, and the ability to operate at various throughput rates all considered together would imply that the ordinary skilled artisan could use very

short throughput times, including those of the instant claim 12, because time is money and the mixer only needs to mix the components as they will clearly react and foam after removal from the mixer in the above discussed process. See the abstract; column 1, lines 38-68; column 2, lines 11-17; column 3, lines 52-68; column 4, lines 30-68; column 5, lines 1-68, particularly 29-67; column 6, lines 1-68, particularly 1-6 and 58-68; column 7, lines 1-12 and the remainder of the document.

The applicant's arguments have been fully considered but are not persuasive for the reasons stated above and because the applicant has not shown that the eddies argued do not interrupt, i.e. baffle, the general flow of the chamber in any manner. It is noted that a mixing method is claimed. However, given that mixing polyol and polyisocyanate and blowing agent to give a foam is per se well known, it would appear that the mixing of the polyol and polyisocyanate and blowing agent to give a foam of the instant claims with the claimed device is the inventive concept. As such, for convenience and because the claims are plain to read, the device per se is specifically noted in the above rejection though it is clearly related to mixing polyol and polyisocyanate as can be seen in the statement that Day mixes polyols and polyisocyanates.

Day need not teach precision mixing. If they did, their disclosure would likely be anticipatory as "throttles" are a known and convenient means for achieving precision dispensing as taught by the cited secondary reference. Precision dispensing in Day would be desired as would be clear to the ordinary skilled artisan and the teachings of Roeser cited above. The above recitation to adjusting the speed of the blades is clear and provides the requisite obviousness rationale. To simplify, think of a motorboat with a propeller drive. Slow rotational speed gives low pressure and slow speed. Fast rotation gives high pressure and high speed. The same principle (attributed to fluid dynamics and Bernoulli's principles above) apply in the mixer of Day as does relativity. The mixer is fixed relative to the reaction chamber and thus cannot move. High speed will give high pressure where the reactants cannot move, i.e. the throttle is closed and low speeds will give low pressures where the throttle is closed. When the throttle is open, high speed will give higher throughput and low speed will give slower throughput. Reaction times can be varied as desired by the ordinary skilled artisan, i.e. the reactants will not fall out of the open exit for the reaction mixture in the above scenario. The reaction product can but will only move if there is a pressure gradient of some sort. The instant claims specify none specifically. Thus, that in Day is sufficient. The secondary references give clear reasons to vary speed and my mixer which is older than the applicant's filing date has variable speed, i.e. variable speed mixers are well known as stated above. No unexpected

results are seen stemming from the differences between the instant claims and the cited prior art in a manner commensurate in scope with the instant claims and the cited prior art.

This rejection is maintained therefore.

2. *The Claimed Methods are Patentably Distinguishable from the Cited References, Alone or in Combination*

Appellants respectfully remind the Board that as stated in MPEP §2143.01, obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion or motivation to do so found either in the references themselves of in the knowledge generally available to one of ordinary skill in the art, citing *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 U.S.P.Q.2d 1941 (Fed. Cir. 1992).

Appellants aver that there clearly is no such teaching, suggestion or motivation shown in the references in this case. Of the references cited by the Examiner, only U.S. Pat. No. 3,319,937 issued to Wilson et al., addresses controlling cell size of a foamed material. Wilson et al. teach, at col. 4, lines 72-73, that a preferred pressure in the mixing zone is between 10 to 15 psi (0.7 to 1 bar). Additionally Wilson et al. use a valve at the outlet of the mixer to adjust the desired pressure inside of the mixing chamber.

However, Wilson et al. fail to address the problem of an increasing pressure in the mixing zone as a consequence of an increasing rotational stirrer speed, and further, they fail to provide any teaching or suggestion to one of ordinary skill in the art as to how to solve the problem. It is well established, *In re Shaffer*, 229 F.2d 476, 108 USPQ 326 (CCPA 1956), that a reference which does not recognize a problem can not suggest a solution. Wilson et al. state at col. 4, lines 66-69, that, "... with higher mixing speeds the average pores in the foam will be quite fine whereas with a decrease in such mixing speed, said pores become coarse and of increased average size". Appellants aver that it is, however, well-known today that the pressure in the mixing chamber is an important parameter with regard to cell size (*See e.g.*, U.S. Pat. No. 5,296,517). One of ordinary skill in the art would be aware

of the conflict between the adjustability of a low pressure and a high rotational stirrer speed in modern plants with high throughput of material up to more than 500 kg/min, and the demand for rather low residence time of the reactive mixture inside the mixing zone, because some mixtures start to gel after a few seconds.

The process described by Wilson et al. would not work with very reactive systems (which start to react after a few seconds), because they suggest a permissible time interval between the introduction of the last liquid component into the head and the ejection of the mixed components from the outlet nozzle is between 10 to 20 seconds (at col. 4, lines 42-43). As a consequence of this very long residence time inside the mixer, the mixer must be designed to be long enough to have good mixing at moderate rotational stirrer speed of 1,500 to 3,000 rpm (at col. 4, lines 64-65). Modern mixers often run at a rotational speed of up to 6,000 rpm, which produces a very strong effect on the pressure in the mixing chamber.

None of the other cited references, either alone or in combination, teach or suggest the instantly claimed process for the control of the cell size in the production of foamed material. Additionally, none of those references mention the possibility of reducing the pressure in the mixing chamber at high rotational stirrer speeds by using a stirrer with inclined blades.

Day, in U.S. Pat. No. 3,807,703, uses a stirrer with inclined blades, but fails to describe the effect of the pressure inside the mixing chamber on the cell size of the foamed material. Porter, in U.S. Pat. No. 3,881,871, describes the use of a valve at the outlet of the mixing zone, but fails to teach or suggest any relationship between pressure and cell size.

Appellants aver that the competing objectives of having proper mixing (which requires high rotational speed), high output (which causes relatively high pressure drop flowing through the mixing chamber), a small residence time (which requires a small mixer volume, increasing the problem of pressure drop of the high amount flowing through the mixing chamber), and a low pressure in the mixing zone are not addressed by any of the cited references.

The inventive method solves this complex problem. Although it is known to manipulate the flow rate through a mixer by changing the rotational speed, if the mixer is fed by a free reservoir, this fails to teach, suggest or motivate one of ordinary skill in the art to use a stirrer with inclined blades to reduce pressure inside the mixing chamber at increasing rotational speed of the stirrer when the components are fed to the mixing chamber in a metered manner by pumps. It is known in the art that the pressure in the mixing chamber has a great influence on foam properties (page 2, lines 22-27 of the instant specification). The instantly claimed method produces a polyurethane foam having adjustable and improved properties.

Thus, the cited combination of references fails to render obvious Claims 1-12, and therefore the rejections thereof under 35 U.S.C. §103(a) should be reversed.

VIII. Conclusion

Therefore, for the reasons set forth above, the rejections of Claims 1-12 under 35 U.S.C. §103(a) are erroneous and the Board's reversal of those rejections is respectfully requested.

Respectfully submitted,

By ______________________

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IX. CLAIMS APPENDIX

1. In a method for the production of a polyurethane foam material, the improvement comprising controlling cell size in the foam made by continuous mixing of at least one polyol component and at least one isocyanate component and optionally additives to form a polyurethane reaction mixture in a stirrer mixer which comprises a cylindrical mixing chamber having a stirrer rotating therein with adjustable rotational speed, the stirrer containing a stirrer shaft and scoops or blades arranged thereon in one or more levels, the stirrer mixer having feed openings for at least the polyol component, the isocyanate component and optionally the additives and an outlet opening for the polyurethane reaction mixture, wherein three to six scoops or blades are arranged in each level on the stirrer shaft such that the scoops or blades are rotated by an angle α of 10° to 80° counter to the axis of rotation of the stirrer shaft,

said method comprising:

pumping the polyol component, the isocyanate component and optionally the additives in a metered manner through the feed openings into the cylindrical mixing chamber and mixing therein to form the polyurethane reaction mixture;

discharging the polyurethane reaction mixture from the mixing chamber through the outlet opening; and

reducing the polyurethane reaction mixture pressure in an adjustable throttle, wherein the cell size is controlled by adjusting pressure in the mixing chamber by a mutually matched setting of the rotational speed of the stirrer and of the throttling effect of the throttle.

2. The method according to Claim 1, wherein the exact adjustment of the pressure in the mixing chamber is made by changing the rotational speed of the stirrer at constant adjustment of the throttle device.

3. The method according to Claim 1, wherein the exact adjustment of the pressure in the mixing chamber is made by adjusting the throttle device at constant rotational speed of the stirrer.

4. The method according to Claim 1, wherein the scoops or blades are rotated by an angle α of 20° to 70° counter to the axis of rotation of the stirrer shaft.

5. The method according to Claim 1, wherein the scoops or blades are rotated by an angle α of 30° to 60° counter to the axis of rotation of the stirrer shaft.

6. The method according to Claim 1, wherein the scoops or blades are rotated by an angle α of 40° counter to the axis of rotation of the stirrer shaft.

7. The method according to Claim 1, wherein the at least one isocyanate component is selected from the group consisting of toluene diisocyanate (TDI) and isocyanates of the diphenylmethane series (MDI).

8. The method according to Claim 1, wherein the at least one polyol component is selected from the group consisting of polyethers, polyesters and polyamines.

9. The method according to Claim 1, wherein the additives are selected from the group consisting of blowing agents, catalysts, emulsifiers, stabilizers, reaction inhibitors, pigments, dyes, flameproofing agents and fillers.

10. The method according to Claim 1, wherein the throttle or throttle device is selected from the group consisting of pinch valves and membrane valves.

11. The method according to Claim 1, wherein the stirrer mixer further includes flow destroying elements affixed to the inner surface of the cylindrical mixing chamber such that the blades or scoops pass between the flow destroying elements during mixing.

12. The method according to Claim 1, wherein the residence time of the reaction mixture inside the mixing chamber is between 0.1 and 2.5 seconds.

X. EVIDENCE APPENDIX

U.S. Pat. No. 5,296,517.

XI. RELATED PROCEEDINGS APPENDIX

None.